



## CLINICAL OUTCOMES OF OPEN REDUCTION AND CANNULATED SCREW FIXATION FOR LATERAL CONDYLAR FRACTURE OF HUMERUS IN CHILDREN

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### ABSTRACT

**Introduction:** Lateral condyle fracture of humerus in children is the most common elbow fracture that involves the growth plate and the second most common elbow fracture children following supracondylar fracture of the humerus. The purpose of the study was to evaluate the clinical outcome of operative treatment of displaced lateral condyle fractures using cannulated cancellous screws.

**Materials and methods:** We reviewed 37 lateral condyle fracture of humerus in children treated with screw fixation, from July 2015 to June 2018. Patient with age 5 to 12 years, closed fracture with displacement >2mm, fracture with enough metaphysical fragment for screw and fracture less than 2 weeks were included. Patients with open fractures, anatomical elbow deformity, associated another injury in the same joint were excluded. Preoperative X-rays were used to classify fracture according to Milch classification Postoperative X-rays were used to evaluate screw positions, fracture union, the presence of growth plate arrest and avascular necrosis.

**Results:** There were 26 boys and 6 girls in the study, with an average age of 7.7 (peak age mode 7, range 5 to 12 years). Average follow-up was 14 months (range 8 to 24 months). The commonest mode of injury was fall down while playing and it was seen in 24 patients (75%), and 8 patients (25%) had fractures caused by motor vehicle accidents. The final outcome was evaluated with Mayo Elbow Performance score. At final follow up 90.62% (n=29) had excellent outcome and 9% (n=3) had good outcome. There were no poor results.

**Conclusion:** Screw provides absolute stability which reduces the possibility of lateral prominence and promotes early fracture union. Absolute stability of fracture permits a nearly range of motion with early return to pre-injury state.

**KEYWORDS :** Lateral condyle; Fracture; Screw fixation

### INTRODUCTION

Lateral condyle fracture of humerus in children is the most common elbow fracture that involves the growth plate and the second most common elbow fracture children following supracondylar fracture of the humerus [1]. It accounts for 10-20% of all elbow fractures in children [2]. Various treatment modalities are available including surgical treatment with closed [3,4], arthroscopic assisted [5,6] or open methods versus nonoperative management with the cast. Operative treatment is considered for displaced fracture >2mm. Minimally displaced fractures are amenable to nonsurgical management. Flynn et al. [7] noted that minimally displaced fractures healed quickly with abundant callus formation. Non displaced fractures are usually treated with cast immobilization, but close follow-up is required as later fracture displacement is a well-documented complication [8].

Although K-wire is the most common metallic implant, a plaster splint or cast is required for a period of immobilization. Few authors suggest that screw fixation promotes fracture union without significant complications [9,10]. There have been very few published reports comparing cannulated screws to K-wires in the displaced lateral condyle fractures [11,12].

However, screw fixation decreases immobilization period. The advantage of screw over K-wire is rotational stability, inter fragmentary compression at the fracture site, prevents secondary fracture displacement, decreases consolidation time and the risk of valgus deformity [13,14].

Here, we retrospectively reviewed patients treated with a screws to evaluate the clinical outcome for the displaced lateral humeral condyle fractures in our set up.

### Materials and methodology:

We conducted this study in 37 patients with fracture lateral

condyle fracture of humerus treated with screw fixation, from July 2014 to June 2016 in VS General hospital. Patient with age 5 to 12 years, closed fracture with displacement >2mm, fracture with enough metaphysical fragment for screw and fracture less than 2 weeks old were included. Patients with open fractures, anatomical elbow deformity, associated another injury in the same joint were excluded. Preoperative X-rays were used to classify fracture according to Milch [8] classification: type I - fracture line courses lateral to the trochlea through the capitulotrochlear groove and type II - fracture line extends into the apex of the trochlea. Postoperative X-rays were used to evaluate screw positions, fracture union, the presence of growth-plate arrest and a vascular necrosis. Demographic data including the age of patients, gender, and mechanism of injury, clinical and radiological union, and complications of surgery were reviewed from patient charts. The mechanism of injury was classified as i. Fall while playing ii. Motor vehicle accidents.

**Surgical technique** General anesthesia was given to all the patients. The patient was placed supine on a radiolucent table. The affected limb was then prepped and draped free. Kocher's approach was used in all the patients. The fracture was reduced and under C-arm, the guide wire was placed perpendicular to fracture line. With the confirmation of proper alignment, 4 mm cannulated screw was passed after drilling and tapping to compress the fracture site. Stability was checked with elbow movement.

**Postoperative management and assessment** Postoperatively, the elbow was immobilized with long arm posterior slab for a week followed by an arm sling. Active elbow range of motion was started once the pain subsides. The suture was removed after 2 weeks. The screw was removed after 5-6 months of surgery. The patient was followed up at 6 weeks, 3 months 6 month and one year. Clinical outcomes were evaluated using Mayo elbow performance score.

## Observations and results

A total of 37 cases were enrolled in the study. Out of which 5 cases got lost till last follow up. Only 32 patients with lateral condyle fracture treated with open reduction and screw fixation met inclusion criteria. There were 26 boys and 6 girls in the study, with an average age of 7.7(peak age mode 7, range 5 to 12years). There was more left sided (18 patients) than right-sided (14 patients) fracture. Milch type II (28, 87.5%) was more common than Milch type I (4, 12.5%). In all the patients, screws were placed in the metaphysis. Average follow-up was 14 months (range 8 to 24 months). The commonest mode of injury was fall while playing and it was seen in 24 patients (75%), and 8 patients (25%) had fractures caused by motor vehicle accidents. The final outcome was evaluated with Mayo Elbow Performance score. At final follow up 90.62% (n=29) had excellent outcome and 9% (n=3) had good outcome



Fig 1 showing preoperative, postoperative and six month followup xray.

## DISCUSSION

Open reduction and internal fixation are indicated for displaced lateral condyle fracture of humerus in children [13]. K-wire fixation requires 4 to 8 weeks of postoperative elbow immobilization with a plaster splint or cast in most instances [15,16]. In the present study, all displaced fractures (over 2 mm) were treated by open reduction and internal fixation with a cannulated screw. Screw provides absolute stability. We didn't use plaster splint to support fractures postoperatively. Active elbow range of motion exercise was started as elbow becomes painless.

Sharma et al. [18] reported that AO cancellous screw compresses the fracture site, permitting early elbow mobilization and avoiding loss of elbow motion. They also mention that screw fixation is technically more demanding procedure compared with K wire fixation.

Wirmer et al. [19] recommended the use of Screw/wire fixation in the operative treatment of lateral condyle fracture of humerus in children. Ayubi et al. [11] also showed the better result with fracture treated with a screw for children age more than 5 years with displacement >2mm. They suggested removing implant 3-4 month after radiological union.

Li et al. [20] in their retrospective study compared Kirschner wires (K-wire) and AO cannulated screw fixation in treatment for the displaced lateral humeral condyle fractures. They found no statistically significant difference in clinical outcome between the two groups and concluded that although the second operation is required for screw removal, screws can reduce the possibility of lateral prominences and promote the elbow function.

The final assessment in our series was evaluated with Mayo Elbow Performance score. At final follow up 90.62% (29

patients) had an excellent outcome and 9% (3 patients) had a good outcome. There were no poor results. The better functional outcome may be due to early fracture union leading to an early return to activities. Early mobility also reduces school absenteeism. There were some limitations to our study. This includes retrospective nature with a small sample size and short follow up. Although we demonstrated that screw fixation results in lower complication, longer follow up are required.

## CONCLUSION

Displaced lateral condyle fractures can be treated successfully by open reduction and internal fixation with partially threaded cancellous screws with excellent results. Screw provides absolute stability which reduces the possibility of lateral prominence and promotes early fracture union. Absolute stability of fracture permits an early range of motion with early return to pre-injury state.

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